Chemical Equations- Putting chemical changes into words

Guided Notes

Review: Element Symbols

* All \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by a 1 or 2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + For example
    - C = \_\_\_\_\_\_\_\_\_
    - Ne = \_\_\_\_\_\_\_\_\_\_
    - O = \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The \_\_\_\_\_\_\_\_\_\_\_\_\_are shown on the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Review: Chemical Formulas

* Chemical formulas show the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_& number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_of each element in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* H2SO4
  + Elements
    - Hydrogen; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Sulfur: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Oxygen: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ total

A chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ representation of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Introduction

* Chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occur when \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ parts of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Chemical reactions involve \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the making of new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with new\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_ changes.
* Symbols represent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ describe \_\_\_\_\_\_\_\_\_\_\_\_\_\_; chemical equations describe a \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reading Chemical Equations

* The two sides of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are separated by an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Reactants-The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ *before* the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_side of the arrow
  + Product(s)-The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side indicates the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *after* the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_ side of an equation \_\_\_\_\_\_\_\_\_\_\_\_\_ a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is written as a set of chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, separated by + symbols.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_ is read as “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”
* **CH4 (g) + 2 O2 (g) → CO2 (g) + 2 H2O(l)**
* The \_\_\_\_\_\_\_\_\_\_\_ (s), (g), and (l) are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ states of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Symbols Used in Equations

* Solid (\_\_\_\_\_\_\_\_\_\_\_\_\_)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (l)
* Gas (\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Aqueous solution (\_\_\_\_\_\_\_\_\_\_\_\_)
* Catalyst H2SO4
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gas (↑)
* Change of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Δ)

For Example: Na + O2 → Na2O

* In this reaction, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(Na) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (O2) react to make a \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Na2O

Coefficients

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ may begin with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* If there is \_\_\_\_\_\_\_\_\_ number, then “1” is \_\_\_\_\_\_\_\_\_\_\_\_\_ to be in \_\_\_\_\_\_\_\_\_\_\_of the formula.
  + This number is called the *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_ of that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_ needed in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + For example:
    - 2H2SO4 – 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Sulfuric Acid
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is distributed to \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - 2 – H2 (for a total of \_\_\_\_\_\_\_\_\_\_ H \_\_\_\_\_\_\_\_\_\_\_)
    - 2 – S (for a total of \_\_\_\_\_\_\_\_\_\_\_\_S atoms)
    - 2 – O4 (for a total of \_\_\_\_\_\_\_ O atoms)

For a grand total of \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Subscripts vs. Coefficients

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_tell you how \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of a particular \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tells you about the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or number, of \_\_\_\_\_\_\_\_\_\_\_\_\_ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Balancing Equations

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ states that in a chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the \_\_\_\_\_\_\_\_\_\_\_\_\_ or amount of each \_\_\_\_\_\_\_\_\_\_\_\_\_\_does \_\_\_\_\_\_\_\_\_\_\_change.
* This means that each side of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must \_\_\_\_\_\_\_\_\_\_\_\_\_\_the same \_\_\_\_\_\_\_\_\_\_\_ of each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; in other words have the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of each kind of \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a chemical reaction you may \_\_\_\_\_\_\_\_\_\_\_\_\_\_Coefficients in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to balance the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but you may not change the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ changes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are determined by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons (charges for ionic or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for covalent)

Steps to Balancing Equations

There are four basic steps to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ a chemical equation.

1. Write the correct \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. DO NOT TRY TO BALANCE IT YET! You must write the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ formulas first. Most importantly, once you write them correctly \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ CHANGE THE FORMULAS!
2. Find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for each \_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the \_\_\_\_\_\_\_\_\_\_\_\_ side. \_\_\_\_\_\_\_\_\_\_\_\_\_\_those against the \_\_\_\_\_\_\_\_\_\_\_\_\_ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ element on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side.
3. Determine where to place \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in front of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side has the \_\_\_\_\_\_\_\_\_\_\_\_\_ number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ side for EACH \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in order to balance the equation.
4. Check your answer to see if:
   * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ on both sides of the \_\_\_\_\_\_\_\_\_\_\_\_\_ are now \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ possible whole number ratios. (reduced)

Some Helpful Hints for balancing equations:

* Take \_\_\_\_\_\_\_\_\_\_\_\_\_\_ element at a time, working \_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_ except for H and O. Save H for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to last and O until \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* IF everything balances \_\_\_\_\_\_\_\_\_\_\_\_\_ for O, and there is \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ to balance O with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and try again. (Because O is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as an \_\_\_\_\_\_\_\_\_\_\_\_- made up of\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atoms)
* (Shortcut) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ions (has three or more atom) that appear on both sides of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ should be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ units

Balancing Equations:

* Na + O2 → Na2O
* In order for this \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be *\_\_\_\_\_\_\_\_\_\_\_\_\_\_,* there must be an \_\_\_\_\_\_\_\_\_\_amount of Na on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_hand side and on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side.
* Right now, there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Na atom on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ but \_\_\_\_\_\_\_\_\_\_\_\_\_ Na atoms on the \_\_\_\_\_\_\_\_\_\_\_\_.
* We solve this problem by putting a \_\_\_\_\_\_\_\_\_\_in \_\_\_\_\_\_\_\_\_\_\_\_\_ of the Na on the \_\_\_\_\_\_\_\_\_\_\_\_\_ hand side, Like this:
  + 2Na + O2 → Na2O
* 2Na + O2 → Na2O
  + There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Na's on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Na's on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. But what about the \_\_\_\_\_\_\_\_\_\_\_\_\_?
  + We now must \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to see if the O's are \_\_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_\_\_\_ sides of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + On the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side there are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_O's and the \_\_\_\_\_\_\_\_\_\_\_ hand side only has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + This is still an *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*equation
* 2Na + O2 → Na2O
* To \_\_\_\_\_\_\_\_\_\_\_ this we must put a \_\_\_\_\_\_\_\_\_\_\_\_\_in front of the Na2O on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side. Now our equation reads:
  + - 2Na + O2 → 2Na2O
* 2Na + O2 → 2Na2O
  + Notice that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side is "\_\_\_\_\_\_\_\_\_\_\_\_\_" to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the Na2 and the O.
  + Currently the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side of the equation has \_\_\_\_\_\_\_\_\_\_\_\_ Na's and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_O's.
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hand side has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Na's total and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_O's.
  + There must be an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_on both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* 2Na + O2 → 2Na2O
* To fix this let's \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 more Na's on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_side.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ equation will now look like this:
* 4Na + O2 → 2Na2O